

is dependent upon the metallic conductors of transmission lines to be unfaulted and

contiguous for proper operation. Further, when used in continuous carrier, guard-and-

shift tone transfer trip applications, it is subject to easy detection and possible defeat or

corruption by equipment placed near the paths of transmission lines or next to

substations.

II. PLC Blocking Schemes

PLC has been used most widely as a trip-blocking medium to prevent electromechanical

directional overcurrent distance relays from tripping outside of their desired operating

distance zone. Older, electro-mechanical protective relays could often times not be

adjusted accurately enough to avoid over-reaching their intended zones of protection,

thus shutting down more of the system than necessary. The solution was to employ

what is called a 'blocking scheme' to prevent the relays outside of the intended zone

from tripping their breakers as well. Schemes were designed such that the relay closest

(and first to trip) picks up, then a blocking signal consisting of a burst of PLC carrier is

transmitted to the distant terminals thus blocking the tripping of remote circuit breakers.

Within the last 15 years, microprocessor-based directional overcurrent relays have been

developed which have far superior setting accuracy and effectively obviate the need for

PLC blocking schemes. These relays are not prohibitively expensive, and are designed

to replace the old relays. Further, these relays offer many additional features in one

device such as remote setting and adjustment, status, and fault finding which make their

operation and maintenance much more cost effective than the older electro-mechanical

devices. And, the fault-finding features help speed repair and restoration of damaged

utility transmission lines by directing repair crews to the exact location of the damage.

Many of these protective relays have their own telecommunication interface functions

included to directly connect to fiber optic or wire line media.

III. PLC Transfer Trip Schemes

Transfer trip, as it is referred to in the utility industry, is basically a means to remotely

initiate a circuit breaker trip. Remote in the sense that the initiator would not be from a

local protective relay in a given substation, but from a distant protective relay or timing

device. Transfer trip, by its nature, should be accomplished via very secure and highly

reliable equipment and media. That is to say if it is important that false tripping not

occur to customer systems and to utility generation, as PSEG alleges.

PLC, by its very nature, is both insecure and less reliable than an independent,

circuitous physical path such as multiplexed microwave, fiber optic cable, or telephone

company lease line media. PLC will fail if the transmission line suffers a line-to-line,

line-to-ground, three phase fault or open condition, since it is dependent upon the

transmission line conductors being normally contiguous. In a typical transfer trip

application, remote breakers are requested to trip if a local breaker should fail to trip,

or, if a remote protective relay cannot be adjusted to trip quickly enough under all

given conditions. Obviously, it is mission-critical that the path for the transfer trip

signal be contiguous and ready to operate when needed to avoid additional damage to

utility equipment. The guard-and-shift tone referred to by PSEG is the method

commonly used on microwave, fiber and telco media as well. However, loss of the

guard tone, by equipment design, does not result in mis-operation, but only an alarm

state, designed to indicate equipment or line malfunction. Selection and use of non-

transmission line paths should be obvious for security and reliability reasons. For most

critical applications, continuously paralleled, multi-directional 'ring-bus'

telecommunication configurations can be used to ensure the highest levels of

supervisory security and reliability.

IV. Impact of Loss of 2.1kHz of Spectrum to PLC

It is reasonable to assume that due to the passband of PLC receivers, shifting 4kHz

from the upper and lower edges of the 2.1kHz band may be necessary. This would

result in the loss of a 10kHz spectrum window to the electric utility industry. PSEG

states that it has 5 PLC systems within the 2.1 kHz of the proposed new Amateur Band.

What percentage of their entire usage of PLC do these 5 systems represent? Assuming

4kHz bandpass of PLC receivers, these systems must be geographically remote from

one another or else the potential for interference already exists between their own PLC

systems. Assuming the extreme case that these 5 systems were to reside in close

proximity to one another, then the total spectrum requirement would be 20kHz to

accommodate these PLC systems. Retuning of wavetraps and changing carrier

frequency for these 5 systems could readily be accomplished, since the tuning range of

the wavetraps most likely considerably exceeds the required spectrum both above and

below the new Amateur Band.

V. Conclusions and Recommendations

The impact of the proposed Amateur Band on PLC systems has been exaggerated.

Also too, has been the importance of PLC to the utility industry. If, in fact, PLC is

still being used as a primary means to provide transfer trip operational control in high

density and critical load areas of the PSEG system, it should be replaced by more

secure and reliable media to ensure that utility systems cannot easily be compromised.

The cost of replacement of electromechanical relays with microprocessor-based relays

is not prohibitive and would lower operation and maintenance costs and would reduce

the impact and duration of electric utility system outages. Costs associated with

operation of transfer trip tone equipment on fiber optic, multiplexed microwave and

telephone company leased lines are not excessive either. Surely the extensive load

shedding, reaction and separation schemes created to protect the Northeast from a

repeat of the massive outage experienced in the 1980s do not depend upon archaic PLC

as a primary medium of telecommunication. As a further example, the Western United

States electric utility grid does not use PLC for any critical supervisory functions

primarily for the reasons cited in these reply comments.

The Commission should designate the new Amateur Band, as proposed. Also, the

Commission should pass along comments addressing electric transmission and

substation control vulnerabilities to the Federal Energy Regulatory Commission and to

the new Homeland Security Department for their review and possible rulemaking

proceedings.

Respectfully Submitted,

/s/

W. Lee McVey, P.E.
1301 86th Court, NW
Bradenton, FL. 34209-9309
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